ABSTRACT

SiC is a very stable substance, and it is difficult to control the condition of a SiC surface to be suitable for crystal growth in conventional Group III nitride crystal growing apparatuses. This problem is solved as follows. The surface of a SiC substrate 1 is rendered into a step-terrace structure by performing a heating process in an atmosphere of HCl gas. The surface of the SiC substrate 1 is then treated sequentially with aqua regia, hydrochloric acid, and hydrofluoric acid. A small amount of silicon oxide film formed on the surface of the SiC substrate 1 is etched so as to form a clean SiC surface 3 on the substrate surface. The SiC substrate 1 is then installed in a high-vacuum apparatus and the pressure inside is maintained at ultrahigh vacuum (such as 10^{-6} to 10^{-8} Pa). In the ultrahigh vacuum state, a process of irradiating the surface with a Ga atomic beam 5 at time t1 at temperature of 800°C or lower and performing a heating treatment at 800°C or higher is repeated at least once. The temperature is then set to the growth temperature of an AlN film, and the SiC substrate surface 3 is initially irradiated with Al atoms 8a in ultrahigh vacuum state, followed by the feeding of N atoms 8b.